Amendments to the Specification

Please replace the paragraph beginning at page 7, line 1 with the following rewritten paragraph:

a1

upstream stage. The departure from the queue occurs when the queue is not empty, and the stage scheduler selects that queue for service. Referring to FIG. 2, to ensure generation of the backpressure signals 82...88, a ~~backpressure generation block 90~~ feedback control block 90 has to be replicated and attached to each of the queues 62...68.

Please replace the paragraph beginning at page 7, line 6 with the following rewritten paragraph:

a2

The disclosed invention ~~allows to reduce~~ reduces the number of queues in the downstream queuing node by aggregating queues 62...68 in a single queue multi-session FIFO queue 69, as shown in FIG. 4, provided that the individual service rates granted to each component session can be accounted for. Regardless of what component sessions within queue 69 ~~is~~ are selected by the scheduler 40, the service is given to the data item at the head of that queue.

Please replace the equation appearing on page 7, line 25 with the following rewritten equation:

$$\cancel{dC_k(t) = \begin{cases} (r_k^{(2)}(t) - a_k^{(2)}(t))\,dt, & if \quad C_k(t) < C_{k0}; \\ (r_k^{(2)}(t) - a_k^{(2)}(t))^{-}\,dt, & if \quad C_k(t) = C_{k0}. \end{cases}}$$

$$\underline{dC_k(t) = \left(r_k^{(2)}(t) - a_k^{(2)}(t)\right) \cdot u\left(C_{k0} - C_k(t)\right) \cdot dt},$$

where:

$$\underline{u(x) = \begin{cases} 1 & \text{if } x > 0 \\ 0 & \text{if } x \leq 0 \end{cases}}$$

Please replace the paragraph beginning at page 8, line 5, with the following rewritten paragraph:

A3

FIG. 5 shows the schematics of the backpressure generation engine implementing the disclosed feedback control method. For simplicity, it shows two component sessions, 52 and 54, aggregated in a single downstream queue 69. Whenever the scheduler 40 selects session 52 (signal 102) or session 54 (signal 104), a data item at the head of queue 69 departs the queuing stage. The feedback control block 100 contains a queue occupancy counter 105 with a comparator 106 and a set of credit modules 120, 140, one per each component session. The queue occupancy counter 105 is originally set to zero and subsequently incremented on event of a data unit arrival to the queue 69 and decremented on the event of data unit departure from the queue 69. When the queue occupancy is equal to zero, as determined by the comparator 106, a reset signal is provided to all credit modules. Each credit module ~~110~~ 140, 120 contains a credit counter 121, 141 with a comparator 123, 143 and an initialization unit 122, 142. On receipt of a reset signal from comparator 106, the corresponding initial credit value provided by initialization units 122, 142, are written to credit counters 121, 141. ~~While~~ When the value of the queue occupancy counter 105 differs from zero, the credit counters 121, 141 change values with data units arrivals from the upstream stage and services granted by the scheduler 40. For example, the credit counter 121, associated with session 52, is incremented whenever session selection signal 102 is generated by the scheduler 40, unless it is equal to the initial credit value supplied by initialization unit 122. The credit counter 121 is decremented when a data unit belonging to session 52 arrives to the queue 69 from the upstream stage. If the value of the credit counter 121 reaches or falls below zero, as determined by comparator 123, a backpressure signal for session 52 is asserted towards the upstream stage. Credit module 140, associated with session 54, operates in a similar fashion. Nothing in this description prevents an implementation following this disclosure from using counters that operate in the reversed direction.

Please replace the paragraph beginning at page 9, line 13, with the following rewritten paragraph:

a4

One embodiment of the disclose invention ~~allows to perform~~ provides downstream aggregation of the spatial channels traversing different upstream queuing modules, as shown in FIG. 6. For simplicity, each spatial channel is assumed to carry a single flow. Flows 211, 221, and 231 traverse upstream queuing modules 210, 220, and 230, respectively, and share downstream queuing module 250. Exemplified by upstream queuing module 210, the traffic of flow 211, which is configured as a session in the scheduling node 215, enters queue 212 serviced by that scheduler. Queues 213 and 214, also served by scheduler 215, carry cross-traffic flows traversing downstream queuing modules other than 250. In the downstream queuing module 250, the traffic flows from the different upstream modules enter the same aggregate queue 252 served by scheduler 255. The feedback control block 258 monitors the state of the queue along with its arrival and departure events and maintains the credit function in the per-flow basis using the disclosed method. The backpressure signals from the feedback control block 258 are communicated to the upstream modules 210, 220, and 230, where, when asserted, they prevent schedulers 215, 225, and 235 from selecting the corresponding sessions for service.

Amendments to the Drawings

The Examiner has objected to Figures 1-7 and 10 because descriptive labels were missing. The objection has been overcome by amending Figures 1-7 and 10 to include descriptive labels. Applicants have attached hereto replacement drawings for Figures 1-7 and 10.

In view of the foregoing, Applicants respectfully request the objection to the drawings be withdrawn.